

## Claims

1. A multistage propylene-based polymer comprising the following components (A) and (B):

5 (A) 5 to 20 wt% of a propylene homopolymer component or a copolymer component of propylene and an  $\alpha$ -olefin with 2 to 8 carbon atoms having an intrinsic viscosity  $[\eta]$  of more than 10 dL/g in tetralin at 135°C; and

(B) 80 to 95 wt% of a propylene homopolymer component or a  
10 copolymer component of propylene and an  $\alpha$ -olefin with 2 to 8 carbon atoms having an intrinsic viscosity  $[\eta]$  of 0.5 to 3.0 dL/g in tetralin at 135°C.

2. The multistage propylene-based polymer according to  
15 claim 1 comprising 8 to 18 wt% of the (A) component and 82 to 92 wt% of the (B) component.

3. The multistage propylene-based polymer according to  
claim 1 of which the melt flow rate is 100 g/10 min or less at  
20 230°C,

the melt flow rate (MFR) at 230°C and the melt tension (MT) at 230°C thereof satisfying the following relationship (1).

$$\log(MT) > -1.33\log(MFR) + 1.2 \quad (1)$$

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4. The multistage propylene-based polymer according to claim 1 wherein the ratio of the storage modulus  $G'(10)$  at an

angular frequency of 10 rad/s to the storage modulus  $G'(1)$  at an angular frequency of 1 rad/s,  $G'(10)/G'(1)$ , is 2 or more; and

the ratio of the storage modulus  $G'(0.1)$  at an angular frequency of 0.1 rad/s to the storage modulus  $G'(0.01)$  at an angular frequency of 0.01 rad/s,  $G'(0.1)/G'(0.01)$ , is 6 or less.

5. A method for producing the multistage propylene-based polymer of any one of claims 1 to 4 comprising:

10 polymerizing propylene, or  
copolymerizing propylene and an  $\alpha$ -olefin with 2 to 8 carbon atoms

by using an olefin polymerization catalyst comprising the following components (a) and (b), or (a), (b), and (c) in 2 or  
15 more polymerization stages:

- (a) a solid catalyst component obtainable by treating titanium trichloride with an ether compound and an electron acceptor, the titanium trichloride being obtainable by reducing titanium tetrachloride with an organoaluminum compound;
- 20 (b) an organoaluminum compound; and
- (c) a cyclic ester compound.

6. The method for producing the multistage propylene-based polymer of claim 5 comprising:

25 producing a propylene homopolymer component or a copolymer component of propylene and an  $\alpha$ -olefin with 2 to 8 carbon atoms having an intrinsic viscosity  $[\eta]$  of more than 10

dL/g in tetralin at 135°C in an amount of 5 to 20 wt% of the polymer in the first polymerization stage, and

producing a propylene homopolymer component or a copolymer component of propylene and an  $\alpha$ -olefin with 2 to 8 carbon atoms having an intrinsic viscosity  $[\eta]$  of 0.5 to 3.0 dL/g in tetralin at 135°C in an amount of 80 to 95 wt% of the polymer in the second polymerization stage.

7. A propylene-based resin composition comprising:

the multistage propylene-based polymer of claim 1, and a propylene-based polymer having a melt flow rate of 30 g/10 min or less at 230°C and a ratio of weight average molecular weight (Mw) to number average molecular weight (Mn) of 5 or less, the weight ratio of the propylene-based polymer to the multistage propylene-based polymer being eight times or more.

8. The propylene-based resin composition according to claim 7, wherein the ratio of the storage modulus  $G'(10)$  at an angular frequency of 10 rad/s to the storage modulus  $G'(1)$  at an angular frequency of 1 rad/s,  $G'(10)/G'(1)$ , is 5 or more; and

the ratio of the storage modulus  $G'(0.1)$  at an angular frequency of 0.1 rad/s to the storage modulus  $G'(0.01)$  at an angular frequency of 0.01 rad/s,  $G'(0.1)/G'(0.01)$ , is 14 or less.

9. A propylene-based resin composition comprising the following component (1), and any one of the following components

(2), (3), and (4):

(1) 100 parts by weight of the multistage propylene-based polymer of claim 1,

(2) 0.1 to 10 parts by weight of a powdery or fibrous porous filler,

(3) 0.05 to 1.0 parts by weight of a chemical foaming agent, and

(4) 0.05 to 1.0 parts by weight of a crystallization nucleating agent.

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10. The propylene-based resin composition according to claim 9, wherein the porous filler is silica, activated carbon, zeolite or silica gel having an average particle diameter of 50  $\mu\text{m}$  or less, or fibrous activated carbon having a fiber diameter of 20  $\mu\text{m}$  or less.

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11. A formed product obtainable by foam-molding the multistage propylene-based polymer of claim 1 or the propylene-based resin composition of claim 7.

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12. The formed product according to claim 11 which is an injection foam-molded product having an expansion ratio of 1.1 to 80 times, the product being obtainable by injection foam-molding using a supercritical carbon dioxide or supercritical nitrogen.

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13. The formed product according to claim 11 which is an

extrusion foam-molded product having an expansion ratio of 1.1 to 80 times.

14. A composite material comprising the multistage  
5 propylene-based polymer of claim 1 or the propylene-based resin composition of claim 7, and at least one material selected from fibers, fillers and rubbers.